इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 7204-3 (1980): Stabilized power supplies dc output, Part 3: Radio frequency interference tests [ETD 31: Power Electronics]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

"पुनर्पुष्ट १९९६"
"RE-AFFIRMED 1996"

IS : 7204 (Part III) - 1980

(Reaffirmed 2001)

Indian Standard

SPECIFICATION FOR STABILIZED POWER SUPPLIES, DC OUTPUT

PART III RADIO-FREQUENCY INTERFERENCE TEST

UDC 621·311·6 : 621·391·823 : [621·396]

© *Copyright* 1980

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

~~*Price Rs* 5·00~~ Gr 3

August 1980

Indian Standard

SPECIFICATION FOR STABILIZED POWER SUPPLIES, DC OUTPUT

PART III RADIO-FREQUENCY INTERFERENCE TEST

Power Convertors Sectional Committee, ETDC 31

Chairman	*Representing*
Shri R. L. Mitra	Railway Board (Ministry of Railways)
Members	
Additional Chief Engineer	Posts & Telegraphs Department, Jabalpur
Director of Telegraphs (X) (*Alternate* I)	
Divisional Engineer (Telegraphs) (Auto) (*Alternate* II)	
Shri R. S. Arora	Directorate General of Supplies & Disposals, New Delhi
Shri Roshan Lal (*Alternate*)	
Dr R. L. Choudhury	Usha Rectifier Corporation (India) Ltd, New Delhi
Shri S. C. Choudhery (*Alternate*)	
Director (Sub-Station)	Central Electricity Authority, New Delhi
Deputy Director (Sub-Station) (*Alternate*)	
Shri M. W. Dukle	E. Ruttonsha Private Ltd, Bombay
Shri M. S. Patwardhan (*Alternate*)	
Shri T. K. Ghose	The Calcutta Electric Supply Corpn Ltd, Calcutta
Shri P. K. Bhattacharjee (*Alternate*)	
Shri A. A. Hattangadi	Research, Designs & Standards Organization (Ministry of Railways), Lucknow
Shri S. Malaviya (*Alternate*)	
Lt-Col A. P. Jain	Directorate of Standardization, Ministry of Defence (DGI)
Shri T. K. Sankaranarayana Rao (*Alternate*)	
Shri M. S. Jayasimha	Indian Telephone Industries Ltd, Bangalore
Shri K. Srinivasan (*Alternate*)	
Dr V. Joshi	NGEF Limited, Bangalore
Shri T. V. G. K. Swamy (*Alternate*)	

(*Continued on page* 2)

© *Copyright* 1980
INDIAN STANDARDS INSTITUTION
This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(*Continued from page* 1)

Members	*Representing*
Shri S. M. Kher	Hind Rectifiers Ltd, Bombay
Shri A. B. Kalbag (*Alternate*)	
Shri R. Manmohan	Elvoc Private Ltd, Calcutta
Dr J. K. Choudhury (*Alternate*)	
Shri M. S. S. Murthy	Bharat Heavy Electricals Ltd, Hyderabad
Shri B. K. Mahajan (*Alternate* I)	
Shri S. K. Raizada (*Alternate* II)	
Shri O. P. Narula	Siemens India Ltd, Bombay
Shri C. K. P. Raman	Hindustan Steel Ltd, Ranchi
Shri S. L. Bhatia (*Alternate*)	
Shri K. N. Ramaswamy	Directorate General of Technical Development, New Delhi
Shri G. L. Keswani (*Alternate*)	
Shri D. N. Sen	Martin Burn Ltd, Calcutta
Shri N. Mayer (*Alternate*)	
Shri M. S. Surana	Hindustan Aluminium Corporation Ltd, Renukoot
Shri I. S. Thapar	National Fertilizers Ltd, Naya Nangal
Shri T. K. Kapur (*Alternate*)	
Shri S. P. Sachdev, Director (Elec tech)	Director General, ISI (*Ex-officio Member*)

Secretary

Shri R. K. Monga
Deputy Director (Elec tech), ISI

Panel for Stabilized Power Supplies, ETDC 31 : P4

Convener	
Dr R. L. Choudhury	Usha Rectifier Corporation (India) Ltd, New Delhi
Members	
Shri S. C. Choudhery (*Alternate* to Dr R. L. Choudhury)	
Shri V. C. Bhandari	Instrumentation Ltd, Kota
Shri Rakesh Verma (*Alternate*)	
Deputy Director Standards (S&T)-III	Research, Designs & Standards Organization, (Ministry of Railways), Lucknow
Deputy Director Standards (ELEC-TH) (*Alternate*)	
Shri S. M. Kher	Hind Rectifiers Ltd, Bombay
Shri S. R. Venkatachary	Posts & Telegraphs Department, Jabalpur
Shri G. P. Vidyarthi (*Alternate*)	

Indian Standard

SPECIFICATION FOR STABILIZED POWER SUPPLIES, DC OUTPUT

PART III RADIO-FREQUENCY INTERFERENCE TEST

0. FOREWORD

0.1 This Indian Standard (Part III) was adopted by the Indian Standards Institution on 30 May 1980, after the draft finalized by the Power Convertors Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard covering stabilized power supplies, dc output, is being prepared in four parts. This part covers radio frequency interference tests only. The other parts are as under:

Part I Terms and definitions
Part II Rating and performance
Part IV Tests other than radio-frequency interference

0.3 This standard specifies the radio-frequency interference measurement equipment which generally conforms to requirements given in IS : 6872-1972*.

0.4 In preparing this standard, assistance has been derived from IEC Publication 478-3 (1976) 'Stabilized power supplies, dc output, Part III : Radio-frequency interference tests' issued by the International Electrotechnical Commission.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

---

*Specification for radio interference measuring apparatus for the frequency range 0·15 MHz to 1 000 MHz.

†Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part III) specifies the measuring equipment and techniques to be used in assessing the radio-frequency interference generated by stabilized power supplies designed to supply dc power from an ac or dc source for application such as in computers, communication, laboratories and industry.

1.2 It also specifies the limits of radio-frequency interference voltages measured at the source terminals and at the load terminals. It is considered that in this way it will be possible to obtain for the great majority of stabilized power supplies, a reasonable degree of compatibility with general electrical and electronic equipment including sensitive measuring instruments, communications equipment and computers.

1.3 The main requirements of this standard relate to power supplies for which the source current required does not exceed 25 A.

However, additional requirements are proposed for cases where the source current required exceeds 25 A.

NOTE — The main requirements of this standard relate to the frequency range 0·15 MHz to 30 MHz. It is possible that special applications may require tests to be made at higher frequencies, and characteristics of the measuring equipment for frequencies up to 1 000 MHz have, therefore, been included in Table 1.

1.3.1 In the case of power supplies for special applications where the radio interference requirements are likely to be more onerous, the measuring equipment and techniques shall be as described in this standard but the limits shall be agreed between the manufacturer and the user.

1.4 Requirements for measurements of radiated interference have not been included in this standard as it is considered that if compliance with the limits for conducted interference is obtained, the power supply should be suitable for operation in most laboratory and industrial environments. Limitation of radiated interference should therefore be a matter of agreement between the manufacturer and the user.

2. POWER SUPPLIES WITH SOURCE CURRENTS NOT EXCEEDING 25 A

2.1 Measuring Set

2.1.1 The radio interference measuring equipment used, shall conform with the requirements of IS : 6872-1972*. The main characteristics of quasi-peak measuring sets for the frequency ranges 0·15 MHz to 30 MHz and 30 MHz to 1 000 MHz are given in Table 1.

---

*Specification for radio interference measuring apparatus for the frequency range 0·15 MHz to 1 000 MHz.

TABLE 1 CHARACTERISTICS OF QUASI-PEAK RADIO INTERFERENCE MEASURING SET

(*Clauses* 1.3 *and* 2.1.1)

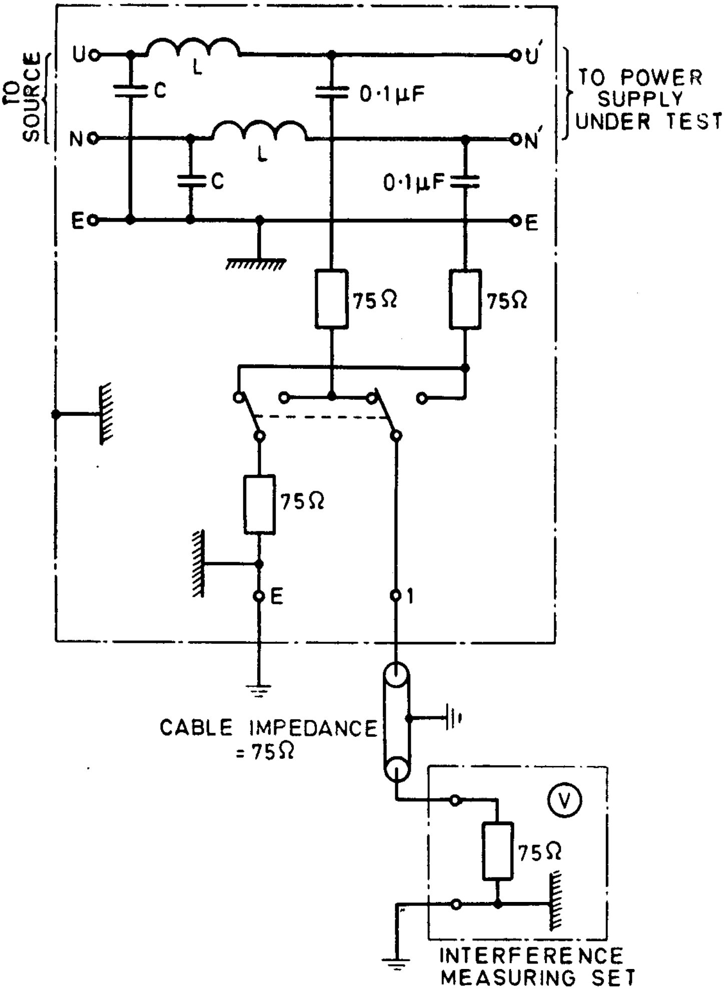
CHARACTERISTIC	FREQUENCY RANGE	
	0·15 MHz to 30 MHz	30 MHz to 1 000 MHz
(1)	(2)	(3)
Bandwidth at ± 6 dB points	9 kHz	120 kHz
Electrical charge time constant of quasi-peak voltmeter	1 ms	1 ms
Electrical discharge time constant	160 ms	550 ms
Mechanical time constant of critically damped indicating meter	160 ms	100 ms
Overload factor of circuits preceding the detector (i. f. amplifier)	30 dB	43·5 dB

2.1.2 Other types of radio interference measuring equipment may be used provided that adequate correlation factors can be established.

2.2 Method of Measurement

2.2.1 The stabilized power supply unit under test shall be connected to the source through an artificial source network which shall provide a defined impedance between each conductor and earth, at radio-frequencies as well as adequate filtering or isolation from the source to ensure that interference extraneous to the power supply does not appear in the measuring circuit.

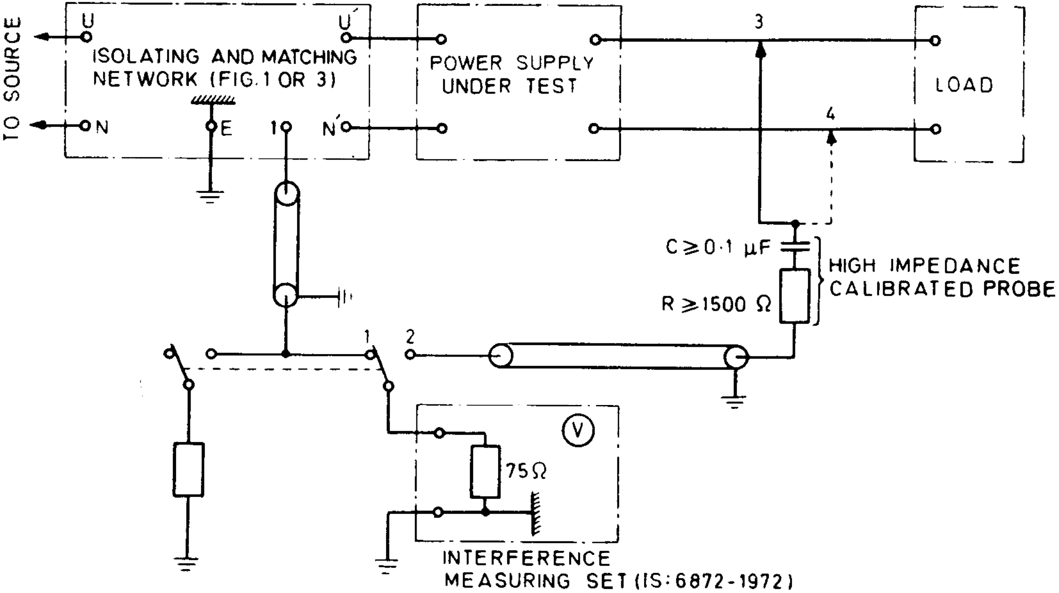
2.2.2 Circuit details of a typical artificial source network for currents up to 25 A are given in Fig. 1. The artificial source network shall have an impedance of 150 ± 20 ohms and phase angle not exceeding 20 between each of the conductors including neutral, if any, and earth. The arrangement and connection of the measuring equipments are given in Fig. 2.



$L = > 500\ \mu\text{H}$
$C = > 0{\cdot}5\ \mu\text{F}$
U, N = Connections to energy source (live and neutral)
U', N' = Connections to stabilized power supply under test

NOTE — The corresponding artificial source network for three-phase supplies uses multiple arm circuits, each arm being identical with one of those shown in the above single-phase V-network.

FIG. 1 ARTIFICIAL SOURCE V-NETWORK (SINGLE PHASE) (SOURCE CURRENTS UP TO 25 A)



Switch Positions 1 = For source measurements
2 = For load measurements
3, 4 = Successive connections during load measurements

NOTE 1 — The earth of the measuring set shall be permanently connected to the V-network.

NOTE 2 — The length of the coaxial cable from the probe should not exceed 2 m.

NOTE 3 — When the switch is in position 2, the output of the V-network at terminal 1 shall be connected to an impedance equivalent to the input impedance of the measuring set.

FIG. 2 CONNECTIONS OF MEASURING SET

2.2.3 The interference voltages are measured successively on the input and output terminals. Measurements shall be made on the load terminals by means of a calibrated high impedance probe containing an isolating capacitor and resistor shown in Fig. 2.

2.2.4 Measurements of radio frequency interference shall be made at supply voltages within the rated source voltage range and throughout the rated load range in order to determine the conditions for maximum interference.

2.3 Minimum Requirements

2.3.1 Under the conditions of measurement as specified in **2.1** and **2.2**, the maximum radio frequency voltage for the source input terminals and for the load terminals shall not exceed the limits given in Table 2.

TABLE 2 RADIO FREQUENCY INTERFERENCE

(*Clause* 2.3)

FREQUENCY RANGE	LIMITS*	
	Input	Output
(1)	(2)	(3)
MHz	mV, *Max*	mV, *Max*
0·15 to 0·5	2	10
0·50 to 30	1	5

*These limits are for currents not exceeding 15 A.

3. POWER SUPPLIES WITH SOURCE CURRENTS BETWEEN 25 A AND 100 A

3.1 Method of Measurement

3.1.1 Circuit details of a tentative artificial source network for currents up to 100 A are given in Fig. 3. The impedance referred to is measured at the appliance terminal of the unit with the measuring set terminal loaded with 50 ohms. The unit is designed for use with measuring sets having an input impedance of 50 ohms. Other measuring sets may be used with suitable matching attenuators. This unit is equivalent to one branch of the V-network and one unit is required for each line under test.

3.1.2 Since high capacitance value is used in the unit given in Fig. 3, the unit shall be either permanently connected to earth or source isolating transformer used.

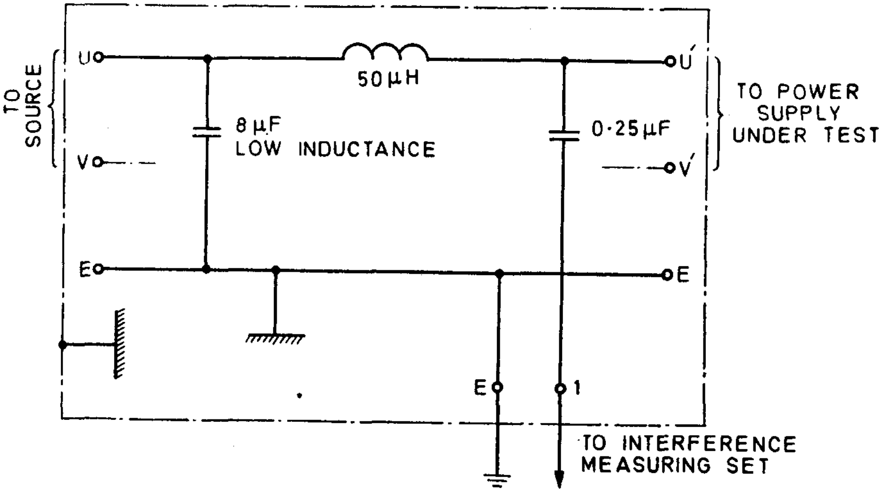


FIG. 3 TENTATIVE ARTIFICIAL SOURCE NETWORK FOR SUPPLY CURRENTS BETWEEN 25 A AND 100 A

3.1.3 The equipment shall be connected as shown in Fig. 2 and the test procedure outlined in **2.2** shall be followed. The measuring equipment described in **2.1** shall be used.

3.2 Minimum Requirements — The applicable limits of permissible radio frequency interference cannot be rigidly defined. These should therefore, be the subject of agreement between the manufacturer and the user, who should notify the manufacturer of any installed equipment which may be susceptible to radio frequency interference.

4. POWER SUPPLIES WITH SOURCE CURRENTS EXCEEDING 100 A

4.1 In the case of large power supplies, no test procedure is specified since it is almost certain that measurements will be made on site. It is recommended that measurements should be made between the source and load lines and earth with the measuring set (as described in **2.1**) connected to the terminals through an isolating capacitor.

INDIAN STANDARDS
ON
POWER CONVERTORS

IS:

1885 (Part XXVII)-1969 Electrotechnical vocabulary : Part XXVII Static power convertors
2511-1963 Polycrystalline semiconductor rectifier stacks
3136-1965 Polycrystalline semiconductor rectifier equipment
3895-1966 Monocrystalline semiconductor rectifier cells and stacks
4540-1968 Monocrystalline semiconductor rectifier assemblies and equipment
6619-1972 Safety code for semiconductor rectifier equipment
7204 (Part I)-1974 Stabilized power supplies dc output : Part I Terms and definitions
7728-1975 Single-phase traction power convertors
7204 (Part II)-1980 Stabilized power supplies dc output : Part II Rating frequency and performance
7204 (Part III)-1980 Stabilized power supplies dc output : Part III Radio frequency interference tests
7204 (Part IV)-1980 Stabilized power supplies dc output : Part IV Tests other than radio frequency interference

INTERNATIONAL SYSTEM OF UNITS

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*
Force	newton	N
Energy	joule	J
Power	watt	W
Flux	weber	Wb
Flux density	tesla	T
Frequency	hertz	Hz
Electric conductance	siemens	S
Electromotive force	volt	V
Pressure, stress	pascal	Pa

INDIAN STANDARDS INSTITUTION
Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002
Telephones : 26 60 21, 27 01 31 Teleg